

Status of 25(OH)D levels in pregnancy: A study from the North Eastern part of India

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ABSTRACT

Introduction: An increased prevalence of vitamin D deficiency has been reported from across the globe including India. Various studies have shown an intrinsic relation between various parameters of maternal and fetal wellbeing with maternal vitamin D status during pregnancy. **Aims:** To look for any association of vitamin D status during pregnancy with the modifiable factors – extent of sun exposure, sunscreen use, vegetarian diet, dietary calcium intake, and multivitamin supplementation. **Materials and Methods:** A total of 50 pregnant females, aged 20–40 years were studied during the first trimester of pregnancy. Fifty age and body mass index (BMI) matched females were taken as controls. Serum 25(OH)D was measured by radioimmunoassay (Diasorin). **Result:** Forty-two percent of the cases were found to have vitamin D deficiency and 14% were found to have vitamin D insufficiency, whereas 20% of the controls had vitamin D deficiency and 24% had vitamin D insufficiency ($P=0.0375$). There was a significant association of 25(OH)D levels with extent of sun exposure, sunscreen use, and vegetarian diet. There was no association of 25(OH)D levels with multivitamin supplementation or dietary calcium intake. **Conclusion:** Vitamin D deficiency was less in our study group as compared with that reported in other Indian studies. Sun exposure, sunscreen use, and vegetarian diet are important modifiable variables significantly associated with vitamin D status in pregnancy.

Key words: Vitamin D status, pregnancy, sun exposure, dietary calcium

INTRODUCTION

An increased prevalence of vitamin D deficiency has been reported from across the globe including India. This study aims to look at the 25(OH)D levels in north-eastern pregnant women and for any association of vitamin D status during pregnancy with the modifiable factors – extent of sun exposure, sunscreen use, vegetarian diet, dietary calcium intake, and multivitamin supplementation. Fifty pregnant females were studied during the first trimester of pregnancy. Fifty age and body mass index (BMI) matched females were taken as controls. Nearly 42% of cases were found to have vitamin D deficiency and 14%

were found to have vitamin D insufficiency, whereas 20% of the controls had vitamin D deficiency and 24% had vitamin D insufficiency ($P=0.0375$). There was a significant association of 25(OH)D levels with extent of sun exposure, sunscreen use, and vegetarian diet. There was no association of 25(OH)D levels with multivitamin supplementation or dietary calcium intake.

MATERIALS AND METHODS

The past two decades have seen a lot of studies regarding vitamin D deficiency during pregnancy from around the globe with a number of implications reported in both mother and the offspring. With increasing evidence of a link between pregnancy and vitamin D deficiency, the present study was carried out in a tertiary care hospital of north-eastern part of India to assess the vitamin D status of pregnant women in the first trimester and its association with maternal parameters like dietary calcium intake, vegetarian diet, multivitamin supplementation, extent of sun exposure, and sunscreen use.

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RESULTS

Fifty pregnant females were studied during the first trimester of pregnancy. Fifty age and BMI matched females were taken as controls. Sunshine exposure was calculated as hours of exposure/day \times percentage of body surface area (BSA) exposed (assessed by the Wallace's rule of nine). Calcium intake was assessed from a 7 day intake record.

- Nearly 42% of the cases had vitamin D deficiency and 14% had vitamin D insufficiency in the first trimester. The mean values of 25(OH)D of the cases was 32.72 ± 21.35 ng/ml, as compared with 38.4 ± 18.37 ng/ml in the controls ($P = 0.0375$).
- The average sun exposure was $33 \pm 9.07\%$. The average duration of exposure was 48 ± 24 minutes. Ninety-three percent of those who had 25(OH)D levels >20 ng/ml had daily exposure $>20\%$ of BSA, whereas 66% of those with 25(OH)D levels <20 ng/ml had daily sun exposure $<20\%$ of BSA ($P = 0.0087$).
- The mean 25(OH)D levels in the cases with calcium intake >1000 mg/day was 32.44 ± 20.86 ng/ml as compared with 32.80 ± 21.77 ng/ml in those with calcium intake <1000 mg/day ($P = 0.3186$).
- Mean 25(OH)D level in those with multivitamin use was higher (33.45 ± 22.71 ng/ml) as compared with those without history of multivitamin use (32.28 ± 20.86 ng/ml) ($P = 1.0000$).
- Nearly 10.34% of those who had 25(OH)D levels >20 ng/ml were vegetarians, whereas 63.63% who had 25(OH)D levels <20 ng/ml were vegetarians ($P = 0.0011$).

DISCUSSION

Previous studies among pregnant women from south and north India have reported high vitamin D deficiency levels with values varying from 67% to 96%.^[1-5] The fact that the entire study was completed within March to October could be responsible for the much lower percentage of vitamin D deficiency in our study. In the study by Sahu *et al.*^[1] vitamin D deficiency was recorded in 54% in the period from May to October and in 93% from November to April ($P < 0.001$). Marwaha *et al.*^[2] also recorded significantly lower values of 25(OH)D in winter as compared with summer. Sachan *et al.*^[3] demonstrated vitamin D deficiency in 84% of pregnant females at term had undertaken their study from September to November. Sun exposure as recorded by some of these studies was also considerably less than that recorded by us.

The average duration of sun exposure in our study was higher than that recorded by Goswami *et al.*^[4] (25 ± 5 minutes). Sahu *et al.*^[1] also reported similar sun exposure values ($35.4 \pm 15.9\%$), whereas Sachan *et al.*^[3] reported much lower values of $4.1 \pm 3.2\%$ and $9.7 \pm 8.1\%$ in urban and rural pregnant women, respectively. We found a significant association of percentage of sun exposure with serum 25(OH) levels. Perampalam *et al.*^[5] also concluded that sun exposure was the main behavioral determinant of vitamin D level in pregnancy. Twenty-three (46%) of the cases used sunscreen of whom 19 (38%) used a particular brand with no specified sun protection factor (SPF) and others used brands with SPF from 15 to 20. A strong significant association between use of sunscreen and serum 25(OH) D levels was found ($P = 0.0007$) in our study.

Other factors attributing to lower percentage of vitamin D deficiency in this study, could be a predominant nonvegetarian food habit as compared with subjects from the northern part of India where most of the studies have been conducted. In addition, rice rather than whole wheat (which forms the staple diet in northern India and contains a large amount of phytate, which causes increased loss of vitamin D through the enterohepatic circulation) is the staple food of people from the north-east.

A low calcium intake has been proposed to aggravate vitamin D deficiency through increased catabolism of 25(OH)D leading to secondary 25(OH)D deficiency. In this study, however, we found no significant association between amount of calcium intake and serum 25(OH)D levels.

The majority of the natural food sources of vitamin D are animal sources (as food fortification is not done in India). This study found a strong significant association between vegetarian diet intake and serum 25(OH)D levels.

CONCLUSION

Vitamin D deficiency in the north-east appears to be less as compared with the rest of the country. However, larger studies are needed before reaching any conclusion. Sun exposure, sunscreen use, and vegetarian diet are important modifiable variables significantly associated with vitamin D status in pregnancy.

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